

Animal Welfare, Ideology, and Political Labels: Evidence from California’s Proposition 2 and Massachusetts’s Question 3

John Bovay and Daniel A. Sumner

This article explains incentives that individuals face when deciding whether to support legislation on farm-animal treatment. We analyze precinct- and town-level voting patterns in two successful referendum votes (California’s Prop 2 and Massachusetts’s Question 3) that restricted animal-housing practices. In both cases, support for the referendum was positively correlated with support for the Democratic candidate for president and negatively correlated with employment in agriculture; support for Question 3 increased with income. We use our regression results to predict how voters in other U.S. states would have voted had they faced similar referendums in 2008 and 2016.

Key words: animal housing, eggs, political economy, referendum, voting

Introduction

In recent years, attention to the treatment of farm animals has become a global phenomenon. The European Union and some states in the United States have adopted regulations on farm production practices for animals from which food—including eggs, milk, and meat—is derived, generally justifying these required practices on the basis of improved animal welfare.¹ In addition, private buyers and marketers have begun to require more stringent standards for the humane treatment of animals from which their products are made. These include large companies such as McDonald’s, which has announced plans to source 100% cage-free eggs in the United States and Canada by 2025, and which already sources 100% cage-free and free-range eggs in other countries (McDonald’s, 2017); and supermarket chains Safeway, which announced plans in 2012 to eliminate gestation crates from its pork supply chain (Humane Society of the United States, 2013), and Whole Foods, which has introduced an animal-welfare rating system on a 5-point scale. Corporate activities like these can generate positive publicity for the companies involved, while putting pressure on rivals to respond with similar claims and goals.

When they enforce standards related to farm-animal treatment, regulators and retailers increase the cost of farming and therefore the price of food, while increasing the market share of a product

John Bovay (corresponding author, john.bovay@uconn.edu) is an assistant professor and extension economist in the Department of Agricultural and Resource Economics at the University of Connecticut. Daniel A. Sumner is the Frank H. Buck, Jr., Distinguished Professor in the Department of Agricultural and Resource Economics, University of California, Davis, the director of the University of California Agricultural Issues Center, and a member of the Giannini Foundation of Agricultural Economics.

The authors appreciate the helpful comments of Julian Alston, Richard Sexton, Wei Zhang, and seminar participants at AAEA, Connecticut College, Iowa State, SAEA, UC Davis, and USDA ERS, and research assistance from Binod Khanal and Yixing Tian.

Review coordinated by Darren Hudson.

¹ This article discusses voter referendums that approved legislation in California (2008) and Massachusetts (2016). Florida (2002) and Arizona (2006) also passed similar laws via ballot initiatives. In 2018, California voters overwhelmingly approved Prop 12, which expanded space requirements and applied them to all eggs, pork, and veal products consumed, not just those produced, in California. For a review of European regulations, see Lundmark et al. (2014).

attribute—animal welfare—that not all consumers value. Put another way, imposing standards reduces the availability of cheap food produced according to conventional animal-treatment practices. Particularly when consumers are able to choose between food produced conventionally and food produced using farm practices associated with *perceived improvements in animal welfare* (PIAW),² the imposition of restrictive standards may lead to private welfare loss for both consumers and producers (Saitone, Sexton, and Sumner, 2015).³ Yet ever more food marketers, regulators, and private citizens are pushing for restrictions on farming practices that reduce consumer choice in favor of perceptions about improved animal welfare.

In many cases, individuals support such legislation even though the production practices are known to increase farm costs and cause higher prices for consumers.⁴ We review the economic and political-science literature to generate insights into the reasons such seemingly paradoxical behavior may occur among a majority of voters in certain states. Some supporters of such legislation likely view animal welfare as a public good that outweighs the negative effects on fellow human beings of increased food prices. In other words, some voters may, in effect, consider hen welfare as a public good while considering human welfare more as a private good. Furthermore, the act of voting is a deliberative process with a different payoff function than purchasing decisions because the likelihood that an individual's vote will be the deciding one is tremendously small. Among other differences, voters' decisions may be swayed by various factors unique to the context of a referendum and not present at the grocery store, such as political advertisements and endorsements by political parties or leading politicians and celebrities.

Following discussion of individuals' (sometimes conflicting) joint roles as voters and consumers, we explore the effects of income, employment in agriculture, and political party affiliations on the outcomes of two referendums, one in California and one in Massachusetts, that mandated production practices associated with PIAW. To test the hypotheses about what may have caused voters to support the referendum enabling the California law, commonly known as Prop 2, we merge data on precinct-level election results for California in 2008 with census data on economic and social characteristics of the voting population in these precincts. We also merge town-level voting data from Massachusetts in 2016 with census data and test the same empirical model in the context of the vote on Question 3.

We find that support for each referendum was higher where support for Democratic presidential candidates was higher and that economic incentives may have helped determine support for both Prop 2 and Question 3. In particular, support for Prop 2, which raised the price of eggs, increased with income and decreased when the share of workers employed in agriculture and related industries was higher. We note, however, that the estimated income effect is statistically insignificant when including demographic controls. Using town-level data for Massachusetts, we find similar effects, robust to the inclusion of demographic and other controls.

In both states, support for the Democratic candidate for president is a strong predictor of support for the referendum, albeit less so in Massachusetts. We also consider predictors of support for ballot measures on PIAW using subsamples of geographies that vary by income level and find that while support for Barack Obama was a strong predictor of support for Prop 2 across all income levels, support for Hillary Clinton was only a good predictor of support for Question 3 in higher-income towns. We speculate that the difference in results was driven by Question 3 not being endorsed by either political party in Massachusetts as well as a shift in political party alignment with ideological positions and demographic identities of voters in 2016.

² We use the term “perceived” here to indicate that perceptions about impacts on animal welfare are what matters for consumer demand. Actual impacts of different production practices, including housing systems, on animal behavior and health may be complex or nuanced but only affect consumer demand through perceptions.

³ The same argument about reduced consumer choice can be made in the context of possible restrictions on many other food production processes, including restrictions on hamburgers made with lean finely textured beef (“pink slime”), meat from animals raised with antibiotics, or food produced with genetic engineering.

⁴ While some supporters of such legislation are vegans or do not consume eggs for other reasons, most do consume eggs and therefore have voted to pass legislation that would cause increased food prices for themselves as well as other consumers.

Background

In November 2008, California voters passed with a 63.5% majority Proposition 2 (Prop 2), which prohibits (conventional) cages for veal calves, egg-laying hens, and pregnant sows that do not allow the animals to “turn around freely, lie down, stand up, and fully extend their limbs” (California Secretary of State, 2008b). Very few hogs or veal calves are raised commercially in California, so the economic implications of Prop 2 are commercially important only with respect to the commercial egg industry. It has been generally accepted that the conventional cage system widely used prior to 2015 did not meet the requirements of Prop 2.

Prop 2 dealt solely with how hens and other animals are raised in California but placed no restrictions on the types of eggs that could be sold in the state (see discussion of a similar phenomenon in the European context in Grethe, 2007). This would have given out-of-state egg producers a significant cost advantage that could have enabled them to capture essentially all of the “conventional” egg market in California with little effect on egg prices for California because costs of egg production would not have increased for out-of-state producers (Sumner, 2017, 2018). California Assembly Bill (AB) 1437, passed in 2010, required that all shell eggs sold in California be produced by hens raised under the standards required by Prop 2 (California State Legislature, 2010). When the requirements of Prop 2 and AB 1437 became effective on January 1, 2015, the costs of egg production for all suppliers to the California market were expected to rise, thereby raising the price of eggs for most Californians, who consumed eggs from conventionally caged hens. Furthermore, as discussed by Sumner (2018), there was considerable uncertainty about the implementation details of Prop 2 and AB 1437 and whether California even has the authority to enact restrictions on how eggs may be produced, given that the laws may be a barrier to interstate commerce. The legal challenges have not yet been fully resolved, and still more uncertainty is on the horizon as Californians consider various proposals to require eggs to come from hens housed in cage-free facilities.

In November 2016, Massachusetts voters passed by an overwhelming margin (77.6% of votes in favor) a referendum very similar to Prop 2. As a result, Massachusetts will prohibit the production *and* sale of eggs and veal produced using cages that prevent the animals from “lying down, standing up, fully extending [their] limbs, or turning around freely,” (nearly identical to the standards of Prop 2) and also prohibit the production and sale of pork with a parent confined in such a manner (Commonwealth of Massachusetts, 2015). Only one farm in Massachusetts is expected to be affected by these restrictions (Shea, 2016), which will go into effect in 2022, so Massachusetts voters (should have) understood that the primary effects of the law would be to increase the cost of egg consumption in the state by banning the conventional product rather than affecting the economic welfare of Massachusetts farmers.

It may be useful to introduce some concrete information on the egg market and the cost of banning the consumption of conventional eggs in California and Massachusetts. On average, a hen lays about 20 dozen eggs per year (see Table 1). In the United States, egg production (i.e., availability) is approximately 23 dozen eggs per person per year. Thus, a rough generalization is that each hen produces the eggs to feed one person; an individual’s decision to consume cage-free or other eggs associated with PIAW (hereafter, PIAW eggs) affects (on average) about one hen.

Malone and Lusk (2016) and Mullally and Lusk (2018) estimate that implementing California’s egg laws in 2015 increased egg prices by somewhere between 17% and 70% (approximately \$0.47–\$1.08 per dozen).⁵ These effects, estimated *ex post*, are consistent with pre-vote expectations: For example, Sumner et al. (2008) reported that retail prices for nonorganic cage-free eggs were priced about 25% higher than conventional eggs. Okrent and Alston (2012) estimated an own-price

⁵ The retail price differential between conventional and specialty eggs is driven at least in part by a difference in costs. Matthews and Sumner (2015) reported that the farm costs of producing eggs using a aviary system are about 36% higher than the costs of using a conventional cage system, which is an inevitable consequence of differences in basic physical requirements between the two systems; the increased farm costs lead to increased consumer prices. In addition to farm costs, demand and vertical differentiation or market segmentation explain the price differential.

Table 1. Egg Market Parameters for California, Massachusetts, and the United States, 2008 and 2016

Description	November 2008	November 2016
Number of egg-laying hens, United States	339 million	368 million
Number of egg-laying hens, California	20 million	12 million
Annual U.S. table egg production	77.0 billion	87.5 billion
Annual U.S. table egg production per hen	18.9 dozen	19.8 dozen
U.S. population	304 million	323 million
California population	36.8 million	39.3 million
Massachusetts population	6.5 million	6.8 million
Annual U.S. table egg production per person	20.8 dozen	22.6 dozen
Specialty eggs as a share of shell egg inventory	6.7% ^a	9.4% ^b
Campaign contributions in support of PIAW legislation	\$10.4 million	\$3.5 million
Campaign contributions in opposition to PIAW legislation	\$7.8 million	\$0.3 million

Notes: The USDA Agricultural Marketing Service does not publish an estimate of the number of egg-laying hens in Massachusetts. Table eggs include both shell eggs and breakers but not hatching eggs.

^a California and Nevada, May 2, 2011; ^b 11-state Northeast region, November 7, 2016.

Sources: U.S. Department of Agriculture (2009, 2011, 2016, 2017); U.S. Census Bureau (2008, 2016a); National Institute on Money in State Politics (2018a,b,c,d).

elasticity of demand for eggs of -0.73 , so price increases of this magnitude could be expected to decrease California's egg consumption by 12%–51%. Mullally and Lusk (2018) estimate annual consumer welfare losses of \$6.63–\$8.17 per household. The lower end of this range of estimates incorporates a small positive welfare change from improved hen housing conditions. At the same time, of course, the regulation decreased the suite of choices available to consumers.⁶

Economic Analysis of Voter Referendums

Numerous studies have considered valuation of public goods in settings ranging from cleaner air or open space to better roads or schools. Most of these studies have been based on data from nonbinding surveys or views on hypothetical legislation rather than data from actual, binding votes. For example, economic experiments have been conducted to try to ascertain subjects' valuation of equitable disbursement of funds (e.g., Andreoni and Miller, 2002) or farm-animal housing and treatment conditions (Norwood and Lusk, 2011a).

This study, by contrast, is one of the first use micro-area election results to characterize economic incentives for how individuals vote on legislation that mandates production of a private good that generates a public good externality. Deacon and Shapiro (1975) pioneered an approach to the analysis of voting using the frame of economic incentives faced by heterogeneous groups of voters across California municipalities. Over the years, applications of this method have been rare because information on microlevel election results, and the mapping between electoral precincts and data on the economic and demographic characteristics of voters in those precincts, has not been widely available outside California. Kahn and Matsusaka (1997) used county-level economic data and data

⁶ If the number of egg-laying hens supplying the California or Massachusetts human population were to decrease as a consequence of new restrictions, then mindful voters would need to consider whether the welfare of farm animals (in a given type of housing system) is good enough that their existence generates a net public good. As discussed by Norwood and Lusk (2011b, p. 224 et seq.), some activists argue that all farm animals suffer substantially in any type of production system. People with such views typically advocate a vegan diet and would prefer an abolition of animal agriculture to a 100% free-range (etc.) system. Depending on one's beliefs, a reduction in the total number of egg-laying hens or a partial or complete switch from the currently-dominant production system to PIAW systems (accompanied by a reduction in hen numbers) could be viewed as a positive or negative contribution to the public good. Furthermore, as Sumner (2017) argued, mindful voters should consider whether the public good generated by a restriction on hen housing is substantial enough to offset the welfare losses to society from higher food prices. If the increased food prices passed on to other people (particularly the poor) are important in voters' considerations of measures like Prop 2 and Question 3, then even vegan voters who care greatly about animal housing might reject a ban on animal-housing practices seen as inhumane.

on California referendum voting outcomes to suggest that wealthier voters, who would stand to lose money by funding environmental projects, were more likely to oppose referendums on such projects. Similarly, Bornstein and Lanz (2008) found that among Swiss voters participating in referendums on taxing fossil-fuel energy consumption, those in the wealthiest and the poorest communes were more likely to oppose the taxes. Examining the financing of other public goods, Boustan et al. (2013) showed that greater income inequality leads local governments—municipalities and school districts—to increase expenditures, but the authors do not examine the outcomes of ballot initiatives. Our model predicts that in areas with greater per capita income, voters would be more likely to support PIAW legislation in that it increases food prices, an effect that would be particularly salient for poor households. Prop 2 represents a relatively unusual policy question in that Democrats supported it despite its disproportionately negative effect on the poor.⁷ Our results show limited evidence that voters were more likely to support PIAW legislation in higher-income areas. This result contrasts with the findings of Brunner, Ross, and Washington (2011), who found that positive economic shocks led to greater support for what they termed “conservative” referendums, whether fiscal or social. It also contrasts with the findings of Bovay and Alston (2016), who found that—even controlling for the share of votes for the Democratic candidates in a precinct—support for Prop 37 in California in 2012 decreased with income.

A few studies have considered voter support for legislation related to animal treatment. Some of these researchers (Tonsor, Wolf, and Olynk, 2009; Tonsor and Wolf, 2011; Richards, Allender, and Fang, 2013; Norwood, Tonsor, and Lusk, 2019) employed surveys to ascertain factors that influenced support for hypothetical restrictions similar to Prop 2. Smithson et al. (2014) used county-level voting and demographic data to characterize the vote on Prop 2. Shortcomings in Smithson et al. (2014), in particular substantially less rich data, limited the reliability and robustness of their findings.

Voting and Preferences over Hen-Housing Policy and Egg Consumption

With Prop 2 and Question 3, a majority of voters supported a local ban on a good (eggs from conventionally housed hens) that nearly all voters consumed and for which versions of the good produced with an alternative technology were relatively expensive. Conventional eggs made up such a large share of the shell egg market in both California in 2008 and Massachusetts in 2016 that the average supporter of Prop 2 and Question 3 must also have been a consumer of conventional eggs. Market data indicate that very few consumers chose to pay such a premium for PIAW eggs, yet by supporting PIAW legislation, 63.5% of Californians who voted on Prop 2 and 77.6% of Massachusetts residents who voted on Question 3 were willing to impose on themselves and other egg consumers a retail price premium by legislating a ban on conventionally caged hens in the state.

By voting in favor of the passage of Question 3, the typical Massachusetts voter supported legislation that would ban consumption of a product he or she routinely consumed,⁸ behavior that could be viewed as paradoxical.⁹ The expected consequence of this ban, under any reasonable economic model, would be to increase the price of eggs by requiring that all eggs sold in Massachusetts be produced using an alternative housing system that adds costs for producers.

⁷ California's Prop 37, rejected by voters in 2012, would also have raised food prices for the poor and was supported primarily by Democrats (Bovay and Alston, 2016).

⁸ Perhaps statewide support for Prop 2 was lower, in part, because the referendum would only have banned production of conventional eggs, pork, and veal but would have allowed shipment of conventional eggs, pork, and veal from other states. In effect, the referendum facing voters would have hurt California businesses and increased food prices with little effect on animal welfare or PIAW; although some voters may have correctly anticipated a solution like AB 1437, there was no certainty about whether it would come to pass at the time of the vote on Prop 2.

⁹ Hamilton, Sunding, and Zilberman (2003) explore this type of paradox using a survey about demand for pesticide-free foods and preferences for a ban on pesticides. They model discrepancies between demand in consumption and in voting using a straightforward regression framework in which willingness to pay (WTP) is determined by one set of exogenous factors and voting is determined by WTP and another set of exogenous factors.

However, many voters would have perceived that this change in production practices would result in the increased provision of a public good: the welfare of egg-laying hens. These factors give rise to a discrepancy between consumption behavior and voting behavior—in that most consumers in every state eat eggs from hens raised using conventional housing systems (in the absence of restrictions) yet most voters in both California and Massachusetts supported restrictions on hen cage size.

The possibility that individuals might make different decisions in purchasing and voting—based on utility functions with different specifications in each context—has been explored by scholars working at the intersection of political science, economics, and philosophy for decades. Pulling together various strands of the literature, it becomes clear that voting is a fundamentally different decision than transaction decisions for several reasons.¹⁰ First, it is costly for voters and consumers to gather and process information, so that individuals may be rationally ignorant (Downs, 1957) about political issues or candidates, product characteristics, or prices. That is, the private costs of becoming informed exceed the private benefits.¹¹ Therefore, individuals sometimes make the wrong decision about voting or market transactions in the sense that they would have made different decisions under full information. In the context of this article, voters were surely less attentive to the price and consumption consequences of the passage of Prop 2 and Question 3 than they were to the prices of various boxes of eggs at the grocery store. Their rational ignorance about these consequences may have driven them to make the wrong choice at the voting booth.¹²

Second, voting outcomes have different effects on individuals and society than outcomes of market transactions made by individuals. In a large society, single individuals' egg-purchasing decisions have little impact on the state of animal welfare in society—instead, as discussed, an individual's purchasing decisions over the course of a year affect approximately one hen. Some studies (Norwood and Lusk, 2011b; Alphonse, Alfnes, and Sharma, 2014; Norwood, Tonsor, and Lusk, 2019) have postulated or found evidence to suggest that discrepancies between individuals' preferences expressed at the ballot box and in the marketplace can be attributed to concerns about free-riding. Furthermore, banning conventionally-produced eggs improves welfare for all hens, so the perceived public-good benefits of the ban far exceed an individual-level decision to consume PIAW eggs—against approximately the same cost.

Third, marketplace decisions of individuals are chiefly characterized by self interest (i.e., the effect of an individual's decision on his or her own utility). However, as outlined by Brennan and Buchanan (1984), the utility function used to evaluate the voting decision involves several factors in addition to effects on an individual's ability to consume private goods (whether through income effects or restrictions on consumption). Voting decisions may also account for provision of public goods, effects on others' consumption of private goods, and an “expressive” or intrinsic effect derived from the act of voting itself.¹³ Furthermore, given that the probability that an individual's vote will be decisive (i.e., tie-breaking) is infinitesimally low, Brennan and Buchanan (1984) characterize the act of voting as essentially an expressive one, extremely likely to have zero bearing on anyone's ultimate consumption or the provision of public goods.

For these reasons, voting on animal-housing restrictions is fundamentally a different decision than buying eggs produced using one type of housing or another. Both the possibility of generating vast societal benefits through providing a public good—better animal welfare—and

¹⁰ For another review of explanations for the differences between voting and buying behavior in the context of food, see Lusk (2018).

¹¹ Caplan (2001) introduces a related concept: When the costs of irrationality are low, it is rational (i.e., utility maximizing) to be irrational.

¹² Properly evaluating the consequences of these referendums would have been extremely costly. Even in retrospect, careful econometric analysis cannot precisely identify the effect of Prop 2 on egg prices (Malone and Lusk, 2016; Mullally and Lusk, 2018; Sumner, 2018).

¹³ The expressive benefit from voting for the winner was noted by Buchanan (1954). Sen (1970) characterized voting as an expression of preferences rather than an attempt to maximize utility. Deacon and Shapiro (1975) developed a similar model to that of Brennan and Buchanan (1984) to evaluate voters' choices on public-goods referendums in California but lacked the expressive component. This expressive or intrinsic effect is much like the warm-glow effect Andreoni (1989) used to explain altruism.

the exceptionally slim probability that one's vote will actually matter result in the individuals placing more weight on ethics (i.e., warm-glow considerations) at the ballot box than at the grocery store (Brennan and Lomasky, 1993). In fact, Brennan and Lomasky (1993) illustrate that in large democracies, when a voter's expressive utility gains (gains from the actual expression of preferences at the ballot box) from voting for a policy change are positive but the effects on utility from a change in policy are negative, it is probabilistically optimal to vote for the policy change.¹⁴ Thus, apparent discrepancies between voting and consumption behavior can mostly be explained by differences between the maximization of expressive utility and utility of consumption.

All of the above justifications or rationalizations for a vote in favor of Prop 2 and Question 3 are predicated on an individual's assessment that banning conventional housing for egg-laying hens generates societal benefits. It is also important to consider that other individuals in society may have positive or negative welfare changes from implementing a PIAW policy. If societal benefits are expected to be negative, then supporters of PIAW legislation arguably regard hen welfare as a public good while regarding the human social welfare as a private good (or, at least, they regard the benefits from perceived improvements in hen welfare as outweighing the costs to human society).¹⁵

Last, we raise the possibility that voters may have supported a ban on conventional eggs despite eating them as some sort of commitment device. That is, support for the ban may have been motivated by a desire to eat PIAW eggs but a lack of willpower to do so. While this may be a reasonable approach to explaining contradictions between attitudes and actions around alcohol (Buchanan, 1954), heroin (Sen, 1977), cigarettes, or donuts (Banerjee and Mullainathan, 2010), we posit that conventionally-produced eggs should not be characterized as a temptation good.

Data and Empirical Hypotheses

The previous section described numerous reasons why individuals might vote to ban a product they routinely consume. Among other considerations, if PIAW eggs are seen as generating a public good with benefits exceeding the costs to society, then voters would have been likely to support California's Prop 2 or Massachusetts's Question 3 despite being forced to pay more when buying eggs. Yet voting patterns on both referendums exhibited substantial heterogeneity. This section develops a dataset that matches micro-area election results with economic and demographic data, allowing us to analyze the effects of economic and social variables on support for each referendum.

Description of Data

For California, we use the 2006–2010 edition of the American Community Survey (ACS) (U.S. Census Bureau, 2010) to obtain data on economic and social characteristics of residents of 19,277 electoral precincts representing 87.7% of votes cast on Prop 2.¹⁶ Of these, 19,203 precincts had at least one vote cast for both Prop 2 and the presidential election.¹⁷ Because we use as our dependent variable a log-odds ratio, we drop all precincts that had 100% support for Prop 2 or 100% opposition

¹⁴ In small electorates where there is a larger probability of a tie, it may be more beneficial to vote selfishly against a policy change.

¹⁵ See Sumner (2017) for additional discussion of the trade-offs between perceived hen welfare and human welfare.

¹⁶ The State of California's redistricting database (University of California Regents, 2014a,b) includes precinct-level results for all statewide elections and all state assembly, senate, and congressional elections since 1992 and the number of registered voters who live in each of the census tracts partially contained within each precinct. To estimate average economic and social characteristics of the voting population in each precinct, we computed weighted averages of the corresponding measures in the census tracts constituting the precinct using as weights the number of registered voters by census tract within each precinct. In examining different political issues, Costa and Kahn (2003), Brunner, Ross, and Washington (2011), and Bovay and Alston (2016) assigned the same weights using the same method.

¹⁷ 12.1% of votes were cast in precincts not associated with a census tract surveyed in this edition of the ACS; less than 0.2% of votes were cast in precincts not associated with any physical space or for which the California redistricting database does not identify a matching census tract.

Table 2. Weighted Averages of Economic and Political Variables, Precinct-Level and Town-Level Observations

Variable	California (2008)		Massachusetts (2016)	
	Weighted Mean	Std. Dev. of Unweighted Data	Weighted Mean	Std. Dev. of Unweighted Data
Per capita income (\$thousands)	34.468	17.778	39.759	12.005
Share of 2-party vote for Democratic presidential candidate	0.625	0.188	0.644	0.128
Share of adults employed in agriculture and related industries	0.010	0.037	0.004	0.015
Share of votes Yes on PIAW legislation	0.636	0.106	0.776	0.069
No. of obs.	18,882 precincts		351 towns	

Notes: Means are weighted by the number of votes cast on Prop 2 or Question 3 in each precinct or town. All precincts with 100% support for Prop 2 or 100% opposition to Prop 2 are dropped from the dataset. These observations are less than 1.7% of all California precincts but are mostly very tiny precincts, accounting for only 941 votes, or less than 0.01% of votes.

Sources: University of California Regents (2014a,b); U.S. Census Bureau (2010, 2016b).

to it,¹⁸ leaving 18,882 precinct-level observations. The distribution of these votes is representative of those in the state as a whole: 63.6% of votes in the sample were in favor of Prop 2, compared with 63.5% in the state. Similarly, 61.7% of votes in the sample were in favor of Obama, compared to 61.0% of voters statewide.

For Massachusetts, we use the 2012–2016 edition of the ACS (U.S. Census Bureau, 2016b) to obtain data on residents of each of the state’s 351 towns and election outcome data from the Secretary of the Commonwealth of Massachusetts (2016).¹⁹ Because Massachusetts does not maintain a database that maps voting precincts to census tracts by number of voters, we revert to town-level data for our analysis. All residents of Massachusetts live in a town and not in unincorporated areas, so the data we use from the ACS covers all voters, although with substantially less precision than the California data.

Precincts with fewer votes cast tended to be in rural areas, and support for Prop 2 and Question 3 tended to be lower in rural areas. In addition, the variance of the vote outcome decreases as the number of votes increases. We control for this bias and heteroskedasticity by weighting the regressions by the number of votes on the respective referendums in each precinct or town to ensure that the precincts and towns with more voters receive more weight. Table 2 presents weighted averages of our key explanatory variables and our dependent variables at the precinct level and unweighted standard deviations for both California in 2008 and Massachusetts in 2016.

Although the considerations described in the previous section emphasize the importance of compassion for fellow human beings versus compassion for hens (i.e., altruism toward either) and ethics, we unfortunately lack data to characterize these effects. Our model also emphasizes external factors that are unique to the context of a referendum or election. Even if we had data on advertising expenditures or exposure, there would be myriad selection issues in that political advertisements should be targeted toward undecided or swing voters. Given these limitations, we therefore use the available data on income, demographics, and political-party voting to explain the outcomes of the votes on Prop 2 and Question 3.

Economic Drivers of Support for Prop 2 and Question 3

In the previous section, we discussed the mechanisms by which voters have incentives to support a law that provides (perceived) public benefits by restricting the production or consumption of a

¹⁸ Precincts with voters unanimously in favor of or opposed to Prop 2 accounted for only 941 votes, less than 0.01% of all votes.

¹⁹ The 2016 (single-year) edition of the ACS, which more accurately reflects characteristics of voters at the time of the 2016 election, has information on only 14 Massachusetts towns.

good and thereby requiring that all eggs be associated with the generation of a public good (PIAW). Nevertheless, support for Prop 2 and Question 3 varied greatly among voters in different precincts. We now characterize the heterogeneous characteristics of voters that may have driven support for PIAW referendums.

In our empirical analysis, we use as our dependent variable support for Prop 2 or Question 3, expressed as the log-odds ratio of voting ($\theta = \ln \left(\frac{\text{Yes votes}}{\text{No votes}} \right)$), as is common in the voting literature (see, e.g., Dubin, Kiewiet, and Noussair, 1992). We regress θ on income variables and a suite of other variables related to voters' characteristics and knowledge, which may have affected their views on Prop 2 and Question 3.

To test the effects of income on support for PIAW referendums, we include in our regressions *per capita income* and *per capita income, squared*, as explanatory variables.²⁰ Shell eggs consumed at home account for only about 0.8% of Americans' food expenditures, and the share of food expenditures spent on eggs decreases with income (U.S. Bureau of Labor Statistics, 2009); eggs have a very low income elasticity of demand.²¹

Of chief importance among the variables related to voter characteristics and voter knowledge is the share of votes in a precinct (or town) for Barack Obama (or Hillary Clinton) for president, as a share of the two-party vote. Although animal welfare or restrictions on farming may not seem, inherently, to be partisan issues, the California Democratic Party endorsed Prop 2.²² We reason that supporters of Barack Obama who were otherwise indifferent about Prop 2 would have been swayed by the endorsement to support the referendum. The political-party ideology effect is not expected to be as strong for Massachusetts in 2016 because (i) neither major party formally stated a position on Question 3 and (ii) candidate Donald Trump's ideological positions and personality differed so starkly from his Republican predecessors that many previously Democratic voters supported him while many previously Republican voters supported Clinton; even if they had viewed Question 3 as an inherently partisan issue, Massachusetts voters may have intentionally avoided aligning their presidential vote with their Question 3 vote.

We also include as an explanatory variable the share of workers in each precinct or town employed in agriculture and related industries. Although the egg industry comprises a small share of all agriculture and agricultural employment in both California and Massachusetts, we suspect that residents of rural communities with relatively more farms and farm workers may oppose additional regulation of agriculture because of their general positive attitudes toward farming and the direct economic effects of agricultural regulations on their communities.²³ Additionally, residents of areas with few farms may be more likely to view animal farms as cruel and to view farm animals as

²⁰ Except for the variables related to voting on presidential candidates, each regressor is from the ACS (2006–10 or 2012–16).

²¹ According to the Consumer Expenditure Survey (U.S. Bureau of Labor Statistics, 2009), the poorest households (earning less than \$5,000 per year) spent \$33 per year on eggs in 2008, while the richest (\$150,000 per year and more) spent \$63. At the upper end of the spectrum, eggs appear to be an inferior good—households earning \$100,000 to \$150,000 spent more on eggs than households earning \$150,000 and more. Aggregate food expenditures for the lowest-income and highest-income groups were \$3,872 and \$13,011, respectively, so the income elasticity of demand for eggs was substantially lower than that for food in general.

²² Support for the Democratic Party could be measured by using the number of registered Democratic voters in a precinct or town. However, party registration is a messy proxy for support for Democrats; voting is not compulsory, and some voters may register as members of a party but consistently vote for another party. California has open primaries, meaning that, for example, voters do not have to be registered as Democrats to vote in the Democratic primary. In other states, voters may register as Democrats in order to sabotage the Democratic primary by voting for an unpopular candidate. Besides using the outcome in the presidential election, support for Democrats could also be measured using the results of down-ballot elections. Bovay and Alston (2016) found that support for down-ballot candidates was not as strong a predictor of support for California's Prop 37 as support for the presidential candidates in 2012. Because we focus in this article on explaining variation in outcomes across two similar referendums in two different states, we report results only for regressions in which support for the presidential candidates is used as our political-ideology regressor.

²³ Farm workers have good reason to support some regulation of agriculture, especially restrictions on pesticide use. We do not expect that farm workers would support mandating costly production systems.

pets—that is, to be more sympathetic to farm animals and less sympathetic to farmers. In addition, we include several control variables in our main regressions.

We use the results from our main regressions for Massachusetts and California to predict results for hypothetical 2008 and 2016 votes on similar referendums in 49 states and the District of Columbia.²⁴

Empirical Results and Interpretations

Our empirical results reveal important similarities and differences between the political and economic factors that drove support for Prop 2 and those that drove support for Question 3. In particular, per capita income had a stronger effect on support for PIAW legislation in Massachusetts in 2016 than it had in California in 2008. Meanwhile, support for the Democratic candidate for president was a strong predictor of support for PIAW legislation in California in 2008, while it was insignificant in our full regression specification for Massachusetts in 2016. In both states, voters in towns with a larger share (i.e., a less-small share) of voters employed in agriculture were likely to oppose the PIAW legislation.

Examining the results for California a bit more closely, we see that in columns 1 and 2 of Table 3, the effect of income on support for Prop 2 is statistically insignificant, with essentially no explanatory power. Introducing support for Barack Obama for president as a regressor substantially improves the predictive power of the model. The effect of support for Obama on support for Prop 2 is robust to the inclusion of many other social and economic characteristics of voters in our full regression specification. We interpret this correlation as causal and that voters' political affiliations partly drove their votes on Prop 2.²⁵ In other words, we suggest that supporters of either presidential candidate who were otherwise indifferent about Prop 2 may have researched the California Democratic Party's position on Prop 2 and cast their votes accordingly.²⁶ The coefficient estimates imply that a 1-percentage-point increase in the share of support for Obama increased support for Prop 2 by 0.4 percentage points.²⁷

We ran identical regressions in the context of the Massachusetts vote on Question 3 in 2016, and results differed in important ways (Table 4). Per capita income had a positive but decreasing effect on support for Question 3, and the statistical significance of the estimated income effect was robust to the inclusion of controls (except in column 8).²⁸

The starkest difference between the results for California in 2008 and those for Massachusetts in 2016 is the relatively weaker effect of support for the major presidential candidates on the Question 3 vote outcome. In particular, the estimated effect of support for Clinton on support for Question 3 is statistically insignificant in columns 8 and 9 and of substantially lower magnitude than the equivalent

²⁴ We do not predict the outcome for Alaska because that state's county-like administrative divisions—across which votes are tabulated—do not correspond with census areas.

²⁵ The alternative, and less plausible, causal explanation is that animal-welfare activists (or those who actively supported Prop 2 for any other reasons) would have voted for Obama because of his or the Democratic Party's position on Prop 2.

²⁶ Every California voter receives an Official Voter Information Guide in the mail, which gives objective information about each proposition as well as pro and con arguments California Secretary of State (2008a). California voters also receive their ballots in the mail before Election Day and can opt to return them by mail or vote at the local polling place, in person, on Election Day. Voters thus have ample opportunity to research information about candidates, referendums, and the positions of political parties vis-à-vis referendums. The California Democratic Party's website recommended "yes" on Prop 2, while the California Republican Party's website recommended "oppose" (California Democratic Party, 2008; California Republican Party, 2008). Voters may also have received postcards or flyers in the mail with each party's recommendations, separate from the Official Voter Information Guide.

²⁷ The coefficient 1.8 implies that a 1-percentage-point increase in the share of support for Obama will lead to an increase in the log-odds ratio of support for Prop 2 by 0.018. Given the mean support for Prop 2 in our dataset, 63.56%, and that $\ln\left(\frac{0.6356}{1-0.6356}\right) = 0.5563$, an increase in the log-odds ratio of 0.018 implies that the linear share of support for Prop 2 increases from the mean to 63.98% (i.e., an increase of 0.42 percentage points).

²⁸ Despite the negative coefficient on the squared income term, support for Question 3 is estimated to rise with income over the entire range of town-level per capita income for Massachusetts.

Table 3. Effects of Political and Economic Variables on Share of Support for Prop 2 at the Precinct Level in California, 2008

	1	2	3	4	5	6	7	8	9
Per capita income (\$ten thousands)	0.013 (0.015) [0.012]	-0.009 (0.043) [0.039]	0.021 (0.007) [0.008]**	0.086 (0.019) [0.019]***	0.011 (0.007) [0.007]	0.057 (0.016) [0.016]***	0.008 (0.020) [0.016]	-0.020 (0.014) [0.016]	-0.009 (0.039) [0.037]
Per capita income, squared (\$ten thousands) ²		0.002 (0.003) [0.003]		-0.007 (0.002) [0.002]***		-0.005 (0.001) [0.002]***	-0.001 (0.002) [0.001]		-0.001 (0.002) [0.002]
Share of support for Obama (among two major parties)			1.844 (0.103) [0.111]***	1.880 (0.101) [0.106]***	1.779 (0.093) [0.104]***	1.809 (0.091) [0.100]***	1.865 (0.109) [0.089]***	1.789 (0.125) [0.101]***	1.792 (0.130) [0.103]***
Share of adults employed in agriculture and related industries					-2.847 (0.481) [0.411]***	-2.661 (0.474) [0.407]***	-2.816 (0.502) [0.416]***	-2.775 (0.499) [0.418]***	-2.773 (0.499) [0.418]***
R ²	0.003	0.004	0.629	0.638	0.661	0.665	0.698	0.700	0.701

Notes: The number of observations in each regression is 18,882. The dependent variable is the log-odds ratio $\ln\left(\frac{Yes\ votes}{No\ votes}\right)$. Each regression includes a constant. Columns 7, 8, and 9 also include controls for the ethnic and gender composition of the voting population (i.e., adult citizens) and the ratio of children and the elderly to working-age adults. Columns 8 and 9 further control for population density, education, and voter turnout (i.e., votes on Prop 2 as a share of votes cast in the presidential election). County-level clustered standard errors are in parentheses; latitude-longitude clustered standard errors are in square brackets. Single, double, and triple asterisks (*, **, ***) indicate significance at the 10%, 5%, and 1% level, respectively.

Table 4. Effects of Political and Economic Variables on Share of Support for Question 3 at the Town Level in Massachusetts, 2016

	1	2	3	4	5	6	7	8	9
Per capita income (\$1000s)	0.058 (0.001)*** [0.010]***	0.201 (0.049)*** [0.062]***	0.045 (0.016)** [0.016]**	0.265 (0.052)*** [0.042]***	0.041 (0.016)** [0.016]**	0.260 (0.058)*** [0.047]***	0.193 (0.059)*** [0.058]***	0.025 (0.023) [0.022]	0.148 (0.083)* [0.091]
Per capita income, squared (\$1000s) ²		-0.016 (0.005)** [0.006]**		-0.024 (0.005)*** [0.004]***		-0.024 (0.006)*** [0.005]***	-0.015 (0.004)*** [0.005]***		-0.011 (0.006)* [0.006]*
Share of support for Clinton (among two major parties)			0.694 (0.133)*** [0.139]***	0.786 (0.093)*** [0.079]***	0.658 (0.127)*** [0.124]***	0.750 (0.097)*** [0.077]***	0.603 (0.323)* [0.239]**	0.493 (0.564) [0.455]	0.592 (0.548) [0.449]
Share of adults employed in agriculture and related industries					-6.256 (3.858) [3.163]*	-6.132 (3.768) [3.114]*	-7.596 (2.837)** [2.332]***	-6.983 (2.730)** [2.290]***	-6.996 (2.686)** [2.244]***
R ²	0.113	0.147	0.307	0.386	0.348	0.425	0.478	0.487	0.495

Notes: The number of observations in each regression is 351. The dependent variable is the log-odds ratio $\ln(\frac{Yes\ votes}{No\ votes})$. Each regression includes a constant. Columns 7, 8, and 9 also include controls for the ethnic and gender composition of the voting population (i.e., adult citizens) and the ratio of children and the elderly to working-age adults. Columns 8 and 9 further control for population density, education, and voter turnout (i.e., votes on Question 3 as a share of votes cast in the presidential election). County-level clustered standard errors are in parentheses; latitude–longitude clustered standard errors are in square brackets. Single, double, and triple asterisks (*, **, ***) indicate significance at the 10%, 5%, and 1% level, respectively.

estimates for California. The statistically insignificant coefficient estimates for Massachusetts may be due to any of at least three reasons: First, the number of observations available for Massachusetts is limited because precinct-level data are not available, so we use only 351 town-level observations.

Second, there was weaker correlation between support for Clinton and support for Question 3, relative to the analogous relationship in California in 2008. The coefficient estimates imply that a 1-percentage-point increase in the share of support for Clinton increased the share of support for Question 3 by about 0.1 percentage points,²⁹ about a quarter the size of the effect as support for Obama had on support for Prop 2. Two factors may explain the differences in outcomes. First, while the California Democratic Party endorsed Prop 2 and the Republican Party of California opposed it, neither party in Massachusetts made a formal statement about Question 3 (to the best of our knowledge). Lacking information on how the political parties viewed Question 3, Massachusetts voters' decisions were less closely linked with their votes in the presidential election. Perhaps more important, the Republican Party in November 2016 appealed to different types of voters than it did in November 2008. While our analysis of national election results from each year show that voters in higher-income counties were more likely to support Democrats, this effect was stronger for Clinton than for Obama. Many working-class, lower-income voters seem to have gravitated toward Trump's campaign message because they identified Trump as either a Republican or a populist (or both) and these labels appealed to them, whether or not the labels reflected reality.³⁰ Similarly, PIAW legislation seems to benefit from being labeled as a Democratic issue and certainly from its alleged benefits to farm animals, whether or not such benefits are reality. In both cases, labeling seems to have trumped reality. We reason that the shift in relative political ideology of the two major parties' presidential candidates in 2016, coupled with the parties' nonendorsements of Question 3, are both responsible for the reduced support for Question 3 among Democrats in 2016 relative to support for Prop 2 in 2008.

Third, the estimated effect of support for the Democratic presidential candidate on support for Question 3 may have been statistically insignificant in the full regression specification because of greater collinearity between support for Clinton and demographic variables. Indeed, although Massachusetts is substantially less diverse than California, the ethnic composition of individual towns in Massachusetts was a better predictor of the 2016 presidential vote than the analogue in California in 2008. (Of course, this relates to the second point, above.) Sympathetic views toward the Republican presidential candidate may have drawn Massachusetts voters toward him but failed to sway other political views, including views on animal welfare and housing.

In addition to the income and presidential vote variables, the share of workers 16 and over who were employed in agriculture and related industries,³¹ as a share of all workers 16 and older, had a strong negative effect on support for Prop 2 and Question 3. Workers in these industries constitute about 1% of all workers in California and a smaller share in Massachusetts; considering the mean value of the dependent variable, a 1-percentage-point increase in the share of workers employed in agriculture and related industries is estimated to decrease the share supporting Prop 2 by approximately 0.65 percentage points. As discussed, the egg industry employs a small number of workers everywhere in California, and only one egg farm in Massachusetts is expected to be affected by Question 3. (The pork and veal industries are not important in either state.) The strong negative effects of agricultural employment on support for PIAW legislation should probably not be attributed to voters' concerns about their personal incomes but rather the general positive attitude of rural residents toward farming and farmers and their propensity not to view farm animals as pets.

²⁹ Using the same calculation method as outlined in footnote 27 above, with coefficient estimates of 0.493 to 0.786 and mean support for Question 3 of 77.64%.

³⁰ In previous surveys and experiments, voters have also shown a tendency to gravitate toward their favored party's candidate even if the voters' ideological positions differed from their party's (Bartels, 2000; Lau and Redlawsk, 2001; Green, Palmquist, and Schickler, 2002).

³¹ The ACS gives the number of workers employed in agriculture, forestry, fishing and hunting, and mining.

Our regressions also control for the demographic characteristics (share of whites, blacks, Asians, Hispanics, and women among the population of adult citizens, i.e., eligible voters), as well as the ratio of children (under 18) and the elderly (over 65) to the working-age (18–65) population. Last, we control for population density, educational attainment, and voter turnout (defined as the number of votes cast on Prop 2 as a share of votes cast in the presidential election).³² Because including these additional explanatory variables has little effect on the explanatory power of the model, we do not report the coefficient estimates.³³

Figures 1 and 2 provide additional evidence on the relationship between support for presidential candidates and support for Prop 2 and Question 3. Figures 1 and 2 indicate the coefficients and 95% confidence intervals for the presidential vote variable in a series of regressions that take the same form as those in Tables 3 and 4, except that the regressions presented in Figures 1 and 2 do not include as regressors income terms, instead breaking the data into subsamples of precincts or towns by per capita income brackets. In Figures 1 and 2, for each income bracket, a dot represents the coefficient β from the regression $\theta_i = \alpha + \beta PresVote_i + \gamma x_i + \varepsilon_i$, where x_i includes all regressors in columns 8 and 9 of Tables 3 and 4, except for income and *PresVote*.³⁴ Figure 1 indicates that, regardless of income level, precinct-level support for Prop 2 could be predicted well by the precinct-level outcome in the 2008 presidential election, with little variation in the coefficient estimates across income brackets.³⁵ Figure 2 shows that support for Question 3 could be most reliably predicted by the local presidential election outcome for towns in which per capita income was above \$50,000 per year. For income levels of \$30,000–\$50,000, the effect of support for Clinton on support for Question 3 was statistically significant at the 5% level; for income levels below \$30,000, support for Clinton had a negative and insignificant effect on the Question 3 vote outcome.

As they relate to the concepts developed earlier to explain how voters may choose to ban consumption of a product they routinely consume, our results lend support to the hypotheses that (i) a regulation on farm practices would be opposed by voters in rural and farming communities because of their general positive attitudes toward farming or because of concerns about the effects of agricultural regulations on their communities; (ii) wealthier voters are more likely to support regulations that raise the price of a consumer good; and (iii) political-party endorsements, and other labels, may induce individuals to vote in ways that seem at odds with their established norms.

Predicting Vote Outcomes in Other States

Last, we use the results from our full regression specifications to predict hypothetical support for referendums on hen housing in 49 states and the District of Columbia in 2008 and 2016.³⁶ We present the results of this exercise in Table 5.³⁷ Our results suggest that animal-welfare legislation

³² We also used other concepts of “turnout” as regressors, including votes on the referendum as a share of total registered voters (available in California but not Massachusetts) and votes on the referendum as a share of adult citizens. Neither of these variables had statistically significant regression coefficients.

³³ We also considered including as potential explanatory variables the share of the local population adhering to various religious denominations based on data from the 2010 U.S. Religion Census, a study designed and conducted by the Association of Statisticians of American Religious Bodies. However, the religion census data proved problematic because the total number of adherents in some counties is reported to exceed the total population. In addition, regressions including the share of the population adhering to each of the main three groups of denominations (Catholic, Mainline Protestant, and Evangelical Protestant)—the only groups that make up a meaningful share of the population in most of the country—yielded insignificant coefficient estimates for these regressors.

³⁴ We use county-level clustered standard errors in the regressions presented in both figures 1 and 2.

³⁵ The statistically significant results for California are robust to using substantially smaller sizes of precinct-bins that more closely resemble the sizes of town-bins used for Massachusetts.

³⁶ Importantly, and largely because political-party agendas may continue to shift, we do not suggest that these predictions should hold for hypothetical elections in future years.

³⁷ For ease of interpretation, the dependent variables used in the prediction regressions are the linear shares of votes in favor of the referendums at the precinct level in California and at the town level in Massachusetts. In each case, we use county-level clustered standard errors. We use county-level election outcome data from Leip (2013, 2017) in making our predictions for the other states.

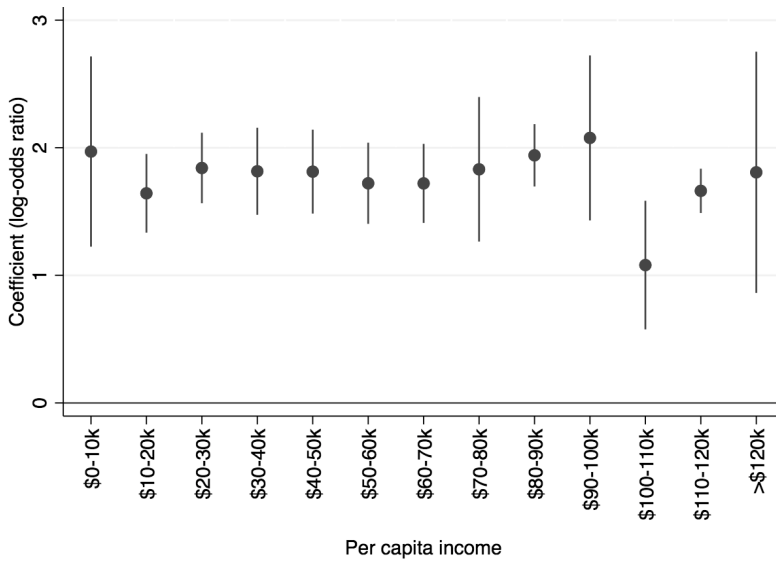


Figure 1. Effects of Support for Barack Obama on Support for Prop 2 in California, 2008, by Income Bracket

Notes: Graph represents coefficient β and 95% confidence interval for the regression $\theta_i = \alpha + \beta PresVote_i + \gamma x_i + \varepsilon_i$, by income bin, as discussed in the text.

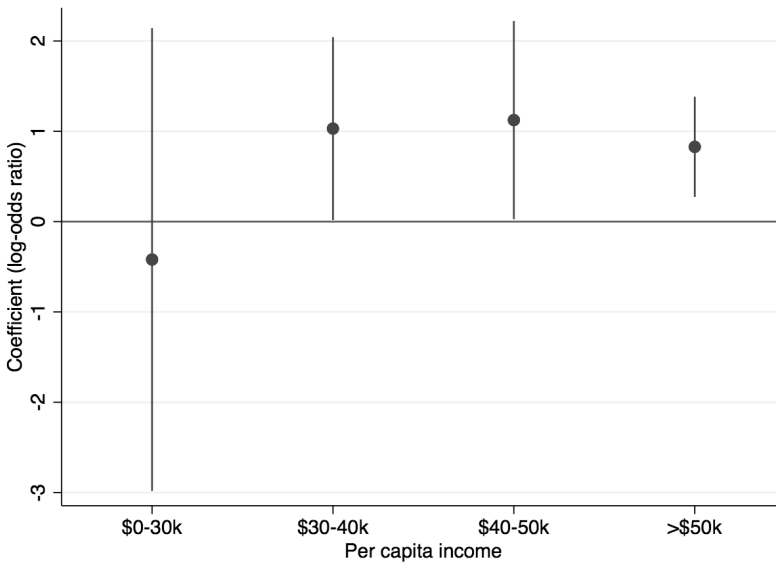


Figure 2. Effects of Support for Hillary Clinton on Support for Question 3 in Massachusetts, 2016, by Income Bracket

Notes: Graph represents coefficient β and 95% confidence interval for the regression $\theta_i = \alpha + \beta PresVote_i + \gamma x_i + \varepsilon_i$, by income bin, as discussed in the text.

Table 5. Predicted Share of Voters in each State that Would Have Supported Legislation like Proposition 2 in the 2008 and 2016 General Elections

	State	Predicted Share	State	Predicted Share	State	Predicted Share	State	Predicted Share	
2008	AL	56.7 ± 1.2	HI	70.2 ± 4.7	MA	68.8 ± 2.2	NM	64.7 ± 1.8	
	AZ	61.4 ± 3.3	ID	55.6 ± 1.8	MI	65.9 ± 1.5	NY	68.4 ± 1.6	
	AR	56.9 ± 1.1	IL	67.4 ± 2.3	MIN	64.5 ± 1.7	NC	61.8 ± 1.0	
	CA	66.6 ± 1.6	IN	63.1 ± 1.1	MS	56.8 ± 0.9	ND	56.6 ± 1.7	
	CO	64.4 ± 1.5	IA	63.5 ± 1.1	MO	62.3 ± 1.5	OH	63.8 ± 1.1	
	CT	67.8 ± 2.7	KS	58.5 ± 1.7	MT	59.1 ± 1.4	OK	54.6 ± 1.5	
	DE	67.1 ± 3.9	KY	58.4 ± 1.2	NE	57.7 ± 1.9	OR	65.3 ± 1.8	
	DC	77.6 ± 6.8	LA	55.1 ± 1.1	NV	65.0 ± 3.6	PA	64.9 ± 1.3	
	FL	63.0 ± 1.2	ME	66.3 ± 1.9	NH	65.7 ± 2.5	RI	69.4 ± 3.3	
	GA	60.0 ± 1.1	MD	66.7 ± 2.0	NJ	65.9 ± 1.5	SC	59.7 ± 1.2	
								SD	57.5 ± 1.5
								TN	59.2 ± 1.3
								TX	58.7 ± 1.2
								UT	57.1 ± 2.4
							VT	70.2 ± 2.1	
							VA	63.1 ± 1.2	
							WA	65.7 ± 2.3	
							WV	58.1 ± 1.1	
							WI	65.2 ± 1.3	
							WY	49.9 ± 1.6	
2016	AL	70.8 ± 1.0	HI	73.8 ± 4.7	MA	77.7 ± 0.5	NM	70.1 ± 1.8	
	AZ	72.8 ± 1.2	ID	65.2 ± 1.0	MI	73.4 ± 0.6	NY	78.9 ± 1.0	
	AR	68.7 ± 0.6	IL	74.9 ± 0.8	MIN	72.7 ± 0.6	NC	72.7 ± 0.5	
	CA	73.5 ± 1.0	IN	71.9 ± 0.5	MS	67.8 ± 0.8	ND	61.0 ± 1.6	
	CO	72.5 ± 0.8	IA	69.4 ± 0.6	MO	71.4 ± 1.3	OH	73.4 ± 0.4	
	CT	77.0 ± 0.7	KS	69.4 ± 0.7	MT	64.5 ± 1.3	OK	65.9 ± 0.8	
	DE	74.9 ± 1.3	KY	69.6 ± 0.5	NE	67.4 ± 0.7	OR	71.3 ± 1.3	
	DC	82.8 ± 3.1	LA	66.7 ± 0.9	NV	72.4 ± 1.1	PA	74.0 ± 0.4	
	FL	74.2 ± 0.5	ME	72.4 ± 1.1	NH	75.4 ± 0.6	RI	76.5 ± 0.9	
	GA	72.3 ± 0.8	MD	76.5 ± 0.9	NJ	76.9 ± 0.6	SC	72.4 ± 0.9	
								SD	63.8 ± 1.0
								TN	72.1 ± 0.8
								TX	69.3 ± 0.6
								UT	69.7 ± 1.5
							VT	73.6 ± 1.7	
							VA	74.5 ± 0.4	
							WA	72.9 ± 1.1	
							WV	66.0 ± 0.7	
							WI	72.1 ± 0.8	
							WY	56.1 ± 2.9	

Notes: Predicted shares (in percentage terms) are given with 95% confidence intervals, assuming prediction errors are normally distributed. States with referendums on animal housing, since 2008, are indicated with boldface. As discussed in the text, Alaska is not included here.

was likely to succeed in nearly every state in these years, with the mean prediction for only one state—Wyoming—falling below 50% support. Our results also suggest that animal-welfare legislation became more likely to succeed over the period 2008–2016. For instance, our model predicts that California voters would have supported Prop 2 with a 66.6% majority (slightly higher than the actual vote share) in 2008 and supported Question 3 with a 73.5% majority in 2016.³⁸ Similarly, the model predicts 68.8% support for Prop 2 in Massachusetts in 2008 and 77.7% support for Question 3 in 2016 (nearly identical to the actual outcome for Question 3).

Bovay and Alston (2016) used a similar empirical method to analyze the outcome of a vote on a different California referendum, Prop 37, which voters narrowly rejected in 2012, and predict results for other states. Prop 37 was also expected to increase food prices for Californians, but it stood in contrast to Prop 2 because it would not have imposed a ban on the sale of a dominant product form; instead, it would have required labeling of certain products if they contained GE material. Bovay and Alston (2016) found that, controlling for the presidential election vote outcome, support for Prop 37 decreased with income. The contrast in results between this paper and Bovay and Alston (2016) may suggest that voters considering Prop 37 understood that it would not limit consumer choice and completely eliminate cheaper product varieties, unlike Prop 2. The results of the state-level projection in Bovay and Alston (2016), which used county-level data on demographics and voting outcomes from Prop 37 and similar referendums on GE labeling in Colorado, Oregon, and Washington, suggest that voters in only three states—Hawaii, Rhode Island, and Vermont—and the District of Columbia would have supported mandatory GMO labeling had they faced a referendum on it in 2012.

Conclusion

Consumer products, including food, can be sold with a range of claims about social- or public-good characteristics associated with the production or consumption of the products. These may include environmental benefits, “fair” labor standards or wages, or information about the provenance of components or genetic composition of ingredients. The regulation of such product attributes, especially the imposition of mandatory standards or the ban of certain production practices, is of growing importance in the global economy.

In this article, we discuss reasons individuals sometimes appear to express different preferences in their roles as consumers and as voters. Individuals who buy conventional animal products yet support restrictions on animal housing technology may behave with cognitive consistency, even if the restrictions they support result in increased prices at retail. Likewise, it may be cognitively consistent to oppose restrictions on animal housing technology, even for voters who highly value PIAW, especially for voters who were concerned about the effects on social welfare of a rise in the price of food. Much of the apparent incongruity between voting and consumption behavior can be rationalized by the warm-glow or expressive utility gains that are realized when casting a ballot, which are probabilistically large compared with the losses (or gains) that would be realized if one’s vote actually were decisive.

Further, by developing and analyzing a unique dataset on precinct-level voting outcomes and economic and social variables, we show that, consistent with our expectations, the anticipated effects of the referendum on personal income and consumption helped determine voters’ support for referendums in California and Massachusetts that mandated farm production practices widely perceived as improving animal treatment. More importantly, voters seem to have responded to political parties’ formal endorsement of or opposition to Prop 2, since local support for the Democratic Party had a much stronger effect on support for Prop 2 than it had on support for Question 3. (Neither party made a formal statement on Question 3.)

³⁸ Recall that the policies proposed under Prop 2 and Question 3 were slightly different, with Prop 2 banning only the sale of products produced using non-PIAW methods but Question 3 banning the production *and* sale of such products.

Our study is one of the first to examine the effects of economic incentives and political endorsements on regulation of production practices for a consumer good in order to generate some public good, using actual micro-area voting data as opposed to a hypothetical survey methodology. We expect that similar factors may determine the outcomes of many other political referendums involving the regulation of food and farming practices in the United States and around the world. However, we urge caution in using the results of this referendum to predict the outcome of future referendums on animal housing or farm regulations, particularly with regard to the connection between political-party affiliation and support for Prop 2, as the alignments of U.S. political parties with respect to both ideology and demographics have changed considerably in recent years.

[First submitted June 2018; accepted for publication August 2018.]

References

- Alphonse, R., F. Alfnes, and A. Sharma. "Consumer vs. Citizen Willingness to Pay for Restaurant Food Safety." *Food Policy* 49(2014):160–166. doi: 10.1016/j.foodpol.2014.06.009.
- Andreoni, J. "Giving with Impure Altruism: Applications to Charity and Ricardian Equivalence." *Journal of Political Economy* 97(1989):1447–1458. doi: 10.1086/261662.
- Andreoni, J., and J. Miller. "Giving according to GARP: An Experimental Test of the Consistency of Preferences for Altruism." *Econometrica* 70(2002):737–753. doi: 10.1111/1468-0262.00302.
- Banerjee, A., and S. Mullainathan. "The Shape of Temptation: Implications for the Economic Lives of the Poor." NBER Working Paper 15973, National Bureau of Economic Research, Cambridge, MA, 2010.
- Bartels, L. M. "Partisanship and Voting Behavior, 1952–1996." *American Journal of Political Science* (2000):35–50. doi: 10.2307/2669291.
- Bornstein, N., and B. Lanz. "Voting on the Environment: Price or Ideology? Evidence from Swiss Referendums." *Ecological Economics* 67(2008):430–440. doi: 10.1016/j.ecolecon.2007.12.026.
- Boustan, L., F. Ferreira, H. Winkler, and E. M. Zolt. "The Effect of Rising Income Inequality on Taxation and Public Expenditures: Evidence from US Municipalities and School Districts, 1970–2000." *Review of Economics and Statistics* 95(2013):1291–1302. doi: 10.1162/REST_a_00332.
- Bovay, J., and J. M. Alston. "GM Labeling Regulation by Plebiscite: Analysis of Voting on Proposition 37 in California." *Journal of Agricultural and Resource Economics* 41(2016):161–188.
- Brennan, G., and J. Buchanan. "Voter Choice: Evaluating Political Alternatives." *American Behavioral Scientist* 28(1984):185–201. doi: 10.1177/000276484028002003.
- Brennan, G., and L. Lomasky. *Democracy and Decision: The Pure Theory of Electoral Preference*. Cambridge, UK: Cambridge University Press, 1993.
- Brunner, E., S. L. Ross, and E. Washington. "Economics and Policy Preferences: Causal Evidence of the Impact of Economic Conditions on Support for Redistribution and Other Ballot Proposals." *Review of Economics and Statistics* 93(2011):888–906. doi: 10.1162/REST_a_00088.
- Buchanan, J. M. "Individual Choice in Voting and the Market." *Journal of Political Economy* 62(1954):334–343. doi: 10.1086/257538.
- California Democratic Party. "Propositions." 2008. Available online at <http://web.archive.org/web/20081016045953/http://www.cadem.org/site/c.jrLZK2PyHmF/b.4213689/>.
- California Republican Party. "CRP Issues Recommendations on Ballot Measures." 2008. Available online at <http://blog.cagop.org/2008/09/crp-issues-recommendations-on-ballot.html>.
- California Secretary of State. "Official Voter Information Guide, California General Election, Tuesday, November 4, 2008." 2008a. Available online at <http://vig.cdn.sos.ca.gov/2008/general/pdf-guide/vig-nov-2008-principal.pdf> [Accessed March 13, 2018].

- . “Text of Proposed Laws: Proposition 2.” 2008b. Available online at <http://vig.cdn.sos.ca.gov/2008/general/text-proposed-laws/text-of-proposed-laws.pdf#prop2> [Accessed March 13, 2018].
- California State Legislature. “AB 1437, Huffman. Shelled Eggs: Sale for Human Consumption: Compliance with Animal Care Standards.” 2010. Available online at http://leginfo.ca.gov/pub/09-10/bill/asm/ab_1401-1450/ab_1437_bill_20100706_chaptered.html [Accessed January 7, 2013].
- Caplan, B. “Rational Ignorance versus Rational Irrationality.” *Kyklos* 54(2001):3–26. doi: 10.1111/1467-6435.00138.
- Commonwealth of Massachusetts. “An Act to Prevent Cruelty to Farm Animals.” 2015. Available online at <https://malegislature.gov/Bills/189/H3930.pdf>.
- Costa, D. L., and M. E. Kahn. “Civic Engagement and Community Heterogeneity: An Economist’s Perspective.” *Perspective on Politics* 1(2003):103–111. doi: 10.1017/S1537592703000082.
- Deacon, R. T., and P. Shapiro. “Private Preferences for Collective Goods Revealed through Voting on Referenda.” *American Economic Review* 65(1975):943–955.
- Downs, A. “An Economic Theory of Political Action in a Democracy.” *Journal of Political Economy* 65(1957):135–150. doi: 10.1086/257897.
- Dubin, J. A., D. R. Kiewiet, and C. Noussair. “Voting on Growth Control Measures: Preferences and Strategies.” *Economics & Politics* 4(1992):191–213. doi: 10.1111/j.1468-0343.1992.tb00062.x.
- Green, D., B. Palmquist, and E. Schickler. *Partisan Hearts and Minds*. New Haven, CT: Yale University Press, 2002.
- Grethe, H. “High Animal Welfare Standards in the EU and International Trade—How to Prevent Potential ‘Low Animal Welfare Havens’?” *Food Policy* 32(2007):315–333. doi: 10.1016/j.foodpol.2006.06.001.
- Hamilton, S. F., D. L. Sunding, and D. Zilberman. “Public Goods and the Value of Product Quality Regulations: The Case of Food Safety.” *Journal of Public Economics* 87(2003):799–817. doi: 10.1016/S0047-2727(01)00103-7.
- Humane Society of the United States. “Safeway Announces Progress in Eliminating Controversial Pig Cages from Supply Chain, Directs Suppliers to Provide Plans for Meeting Demand.” 2013. Available online at http://www.humanesociety.org/news/press_releases/2013/12/safeway_gc_progress_121913.html [Accessed March 13, 2018].
- Kahn, M. E., and J. G. Matsusaka. “Demand for Environmental Goods: Evidence from Voting Patterns on California Initiatives.” *Journal of Law & Economics* 40(1997):137–173. doi: 10.1086/467369.
- Lau, R. R., and D. P. Redlawsk. “Advantages and Disadvantages of Cognitive Heuristics in Political Decision Making.” *American Journal of Political Science* 45(2001):951–971. doi: 10.2307/2669334.
- Leip, D. “2008 Detailed General Election Data for President.” 2013. Available online at <https://uselectionatlas.org/>.
- . “2016 Detailed General Election Data for President.” 2017. Available online at <https://uselectionatlas.org/>.
- Lundmark, F., C. Berg, O. Schmid, D. Behdadi, and H. Röcklinsberg. “Intentions and Values in Animal Welfare Legislation and Standards.” *Journal of Agricultural and Environmental Ethics* 27(2014):991–1017. doi: 10.1007/s10806-014-9512-0.
- Lusk, J. L. “Separating Myth from Reality: An Analysis of Socially Acceptable Credence Attributes.” *Annual Review of Resource Economics* 10(2018):65–82. doi: 10.1146/annurev-resource-100517-023153.
- Malone, T., and J. L. Lusk. “Putting the Chicken before the Egg Price: An *ex Post* Analysis of California’s Battery Cage Ban.” *Journal of Agricultural and Resource Economics* 41(2016):518–532.

- Matthews, W. A., and D. A. Sumner. "Effects of Housing System on the Costs of Commercial Egg Production." *Poultry Science* 94(2015):552–557. doi: 10.3382/ps/peu011.
- McDonald's. "Working with Suppliers to Protect Animal Health and Welfare." 2017. Available online at <http://corporate.mcdonalds.com/corpmcd/scale-for-good/our-food/animal-health-and-welfare.html>.
- Mullally, C., and J. L. Lusk. "The Impact of Farm Animal Housing Restrictions on Egg Prices, Consumer Welfare, and Production in California." *American Journal of Agricultural Economics* 100(2018):649–669. doi: <https://doi.org/10.1093/ajae/aax049>.
- National Institute on Money in State Politics. "Californians for Humane Farms." 2018a. Available online at <https://www.followthemoney.org/entity-details?eid=10243802>.
- . "Citizens against Food Tax Injustice." 2018b. Available online at <https://www.followthemoney.org/entity-details?eid=42069604>.
- . "Citizens for Farm Animal Protection." 2018c. Available online at <https://www.followthemoney.org/entity-details?eid=40356250>.
- . "Citizens for Safe Food." 2018d. Available online at <https://www.followthemoney.org/entity-details?eid=10243805>.
- Norwood, F. B., and J. L. Lusk. "A Calibrated Auction-Conjoint Valuation Method: Valuing Pork and Eggs Produced under Differing Animal Welfare Conditions." *Journal of Environmental Economics and Management* 62(2011a):80–94. doi: 10.1016/j.jeem.2011.04.001.
- . *Compassion, by the Pound: The Economics of Farm Animal Welfare*. Oxford, UK: Oxford University Press, 2011b.
- Norwood, F. B., G. Tonsor, and J. L. Lusk. "I Will Give You My Vote but Not My Money: Preferences for Public versus Private Action in addressing Social Issues." 2019.
- Okrent, A. M., and J. M. Alston. "The Effects of Farm Commodity and Retail Food Policies on Obesity and Economic Welfare in the United States." *American Journal of Agricultural Economics* 94(2012):611–646. doi: 10.1093/ajae/aar138.
- Richards, T. J., W. J. Allender, and D. Fang. "Media Advertising and Ballot Initiatives: The Case of Animal Welfare Regulation." *Contemporary Economic Policy* 31(2013):145–162.
- Saitone, T. L., R. J. Sexton, and D. A. Sumner. "What Happens When Food Marketers Require Restrictive Farming Practices?" *American Journal of Agricultural Economics* 97(2015):1021–1043. doi: 10.1093/ajae/aav021.
- Secretary of the Commonwealth of Massachusetts. "PD43+ Massachusetts Election Statistics." 2016. Available online at <http://electionstats.state.ma.us/>.
- Sen, A. K. *Collective Choice and Social Welfare*. San Francisco, CA: Holden-Day, 1970.
- . "Rational Fools: A Critique of the Behavioral Foundations of Economic Theory." *Philosophy & Public Affairs* (1977):317–344.
- Shea, A. "Containment of Farm Animals: A Primer on Question 3 in Mass." 2016. Available online at <http://www.wbur.org/morningedition/2016/09/20/farm-animal-containment-ballot-question>.
- Smithson, K., M. Corbin, J. L. Lusk, and F. B. Norwood. "Predicting State-Wide Votes on Ballot Initiatives to Ban Battery Cages and Gestation Crates." *Journal of Agricultural and Applied Economics* 46(2014):107–124. doi: 10.1017/S1074070800000663.
- Sumner, D. A. "Economics of US State and Local Regulation of Farm Practices, with Emphasis on Restrictions of Interstate Trade." *Annual Review of Resource Economics* 9(2017):13–31. doi: 10.1146/annurev-resource-100516-053646.
- . "Comment on 'The Impact of Farm Animal Housing Restrictions on Egg Prices, Consumer Welfare, and Production in California'." *American Journal of Agricultural Economics* 100(2018):670–673. doi: 10.1093/ajae/aay013.
- Sumner, D. A., J. T. Rosen-Molina, W. A. Matthews, J. A. Mench, and K. R. Richter. *Economic Effects of Proposed Restrictions on Egg-Laying Hen Housing in California*. Davis, CA: University of California Agricultural Issues Center, 2008. Available online at <http://aic.ucdavis.edu/publications/eggs/egginitiative.pdf>.

- Tonsor, G. T., C. Wolf, and N. Olynk. "Consumer Voting and Demand Behavior regarding Swine Gestation Crates." *Food Policy* 34(2009):492–498.
- Tonsor, G. T., and C. A. Wolf. "On Mandatory Labeling of Animal Welfare Attributes." *Food Policy* 36(2011):430–437. doi: 10.1016/j.foodpol.2011.02.001.
- University of California Regents. "Statewide Database. 2008 General Election Geographic Data." 2014a. Available online at http://statewidedatabase.org/d00/g08_geo_conv.html.
- . "Statewide Database. 2008 General Election Precinct Data." 2014b. Available online at <http://statewidedatabase.org/d00/g08.html>.
- U.S. Bureau of Labor Statistics. "Consumer Expenditure Survey 2008 Expenditure Tables." 2009. Available online at <http://www.bls.gov/cex/csxstnd.htm#2008> [Accessed March 8, 2018].
- U.S. Census Bureau. *American Community Survey 1-Year Estimates*. Washington, DC, 2008. Available online at <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml> [Accessed February 5, 2018].
- . *American Community Survey 5-Year Estimates (2006–2010)*. Washington, DC, 2010. Available online at <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml> [Accessed February 5, 2018].
- . *American Community Survey 1-Year Estimates*. Washington, DC, 2016a. Available online at <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml> [Accessed February 5, 2018].
- . *American Community Survey 5-Year Estimates (2012–2016)*. Washington, DC, 2016b. Available online at <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml> [Accessed February 5, 2018].
- U.S. Department of Agriculture. *Chickens and Eggs (January 2009)*. Washington, DC: U.S. Department of Agriculture, National Agricultural Statistics Service, 2009. Available online at <http://usda.mannlib.cornell.edu/usda/nass/ChicEggs//2000s/2009/ChicEggs-01-23-2009.pdf>.
- . *USDA Egg Market News Report, May 2*. Washington, DC: U.S. Department of Agriculture, Agricultural Marketing Service, 2011. Available online at <https://marketnews.usda.gov/mnp/py-report-config> [Accessed March 13, 2018].
- . *USDA Egg Market News Report, November 7*. Washington, DC: U.S. Department of Agriculture, Agricultural Marketing Service, 2016. Available online at <https://marketnews.usda.gov/mnp/py-report-config> [Accessed March 13, 2018].
- . *Chickens and Eggs (January 2017)*. Washington, DC: U.S. Department of Agriculture, National Agricultural Statistics Service, 2017. Available online at <http://usda.mannlib.cornell.edu/usda/nass/ChicEggs//2010s/2017/ChicEggs-01-24-2017.pdf> [Accessed March 13, 2018].